involves but a relatively small part of the atmosphere but when horizontal convection comes into play as in the case of strong cyclonic circulations the air in situ over any place is being constantly replaced by air drawn from a distance and if that air be moist heavy precipitation naturally results. As the cyclone center moves away the source of the air supply is changed and more frequently than not, in the United States at least, the new supply comes from a colder and drier region. Vertical convection in this air is not probable, the rain ceases and the chain of events which led up to precipitation must be begun de novo. Thus the natural reaction from heavy rain must be a more or less lengthy period of little or no rain.

The second interesting item in the summary is that temperature in Samoa and, inferentially, over the ocean in that part of the Southern Hemisphere during 1926, was higher than usual. And this fact confirms the advices of high temperature in the Argentine that have come to hand.—*A. J. H.*

IMPROVED TABLES FOR DETERMINING TRUE WIND AT SEA

[EDITOR'S NOTE: With reference to the availability of these tables, the following quotation from a letter from Rear Admiral W. A. Moffett, United States Navy, under date of December 14, 1926, is of interest:

"The values have been computed by the Bureau of Aeronautics and compilation of the tables has just been completed. * * * Printed copies will be available later."]

The wind observed aboard a moving ship is the resultant of the true wind and the ship's movement. The observed wind uncorrected for the ship's movement is usually called the apparent wind. The true wind may be found graphically by laying off one vector representing the ship's course and speed expressed in an opposite direction, laying off the apparent wind as a resultant, and joining the termini of the two quantities to determine the second vector which is the true wind. Mechanical devices which operate on the principle of graphical solution have been used from time to time for this purpose. It is doubtful, however, if either the graphical or the mechanical solution of determining true wind is in general as convenient as a set of suitable tables.

The tables most commonly in use among mariners for obtaining true wind is a single page table such as that given in Table 32 of the American Practical Navigator (Bowditch) and the table on page 5 of W. B. 1201 (Marine, 1923), which express wind velocity in Beaufort force. While this brief table is probably satisfactory for wind observations made without the aid of instruments, it does not afford sufficient refinement for wind velocities obtained by anemometer where wind readings are desired to the nearest mile per hour. A further inaccuracy resulting from the use of the single page table expressed in Beaufort force is caused by the occasional changes which have been made in the mile per hour equivalents to the various force numbers. These changes have been made from time to time as modern tests have improved the accuracy of determinations of the equivalents. Each change in equivalents necessitates a change in certain of the corresponding values of true wind. As a result, the tables in use by various observers are not in agreement.

The expansion in late years of the use of anemometers aboard ship and the need of aviation squadrons operating at sea from a base ship for accurate wind data in knots has created a demand for more detailed tables for converting apparent wind to true wind. Tables for this purpose have just recently been completed.

These contain a separate table for each of the 16 points off the bow from which the apparent wind may blow. Each table provides a column for ship's speeds from 5 to 30 knots at 5-knot intervals. The left hand argument in each table contains apparent wind velocities in knots from calm to 30 knots at 2-knot intervals, from 30 to 46 knots at 4-knot intervals, and above 46 at 10-knot intervals up to 100 knots. The tables are arranged to facilitate interpolation to the nearest knot for any apparent wind velocity up to 100 knots. Intermediate values of ship's speed may be readily interpolated also. Tables appended to the bottom of each page make it easy to convert true wind relative to the ship's bow to true wind in compass points—namely, north, north-northeast, and so on. The tables are arranged so that they may be readily used for wind velocities expressed in other common velocity units, such as meters per second. A device is provided which makes it possible to convert directions to the nearest 16 points of the compass if direction to 32 points is not desired.

The advantages of the new tables over the table now commonly used may be summarized briefly as follows: (1) True wind may readily be determined to the nearest knot (when anemometer is available), thus increasing the accuracy of wind data; (2) a greater choice of ship's speeds is available and interpolations for intermediate ship's speeds are facilitated by the arrangement of the tables; (3) the tables may be used for wind expressed in knots, meters per second, Beaufort force, statute miles per hour or "miles per hour," as indicated by the old style four-cup anemometer. This feature furnishes convenient conversion tables for changing from one velocity scale to another; and (4) the tables appearing at the bottom of each page make it easy to change direction relative to the ship's bow to direction in compass points.—*F. W. Reichelderfer*, Lieutenant, U. S. Navy, Aerological Section, Bureau of Aeronautics.

PILOT BALLOON ASCENTS ON THE WEST COAST OF GREENLAND—A CORRECTION

We have received from Dr. P. L. Mercanton of Lausanne, Switzerland, the following note:

In the Monthly Weather Review, October, 1926, p. 247, "Return of the University of Michigan Greenland Expedition of 1926," I read the following statement:

"Study of the upper air by means of the simple pilot balloons has never before been made over or close to the vast ice-cap of Greenland. * * *"

I might be allowed to correct this: Seven pilot-balloon ascents have been made in August, 1912, at Quervain'shavn, West Greenland (lat. N. 69° 46'; long. W. 50° 15'; alt. 10 m.), by the Swiss Expedition across Greenland, 1912–13. The station lay some quarter of a nautical mile to the south of the Ekip Sermia outlet of the Greenland ice cap and about 3.5 miles to the west of its main border. One of the balloons disappeared in the Ci-Str layer more than 7,000 meters high.

This is, however, by no means the maximum height reached. At Godhavn (Disco Island) the Swiss scientist recorded 16,400 and 22,400 meters on the 11th and 12th of March, 1913, and—last but not least—39,000 meters (about 21 miles) on the 25th of February. No conclusive evidence has been brought against this last record.

No doubt Professor Hobbs failed to discover these ascents of Quervain'shavn in the lot of nearly a hundred managed by the Swiss Expedition [1] and will be glad to have his attention drawn to them.

[1] RESULTATS SCIENTIFIQUES DE L'EXPEDITION SUISSE AU GRÖNLAND, 1912–13, par A. DE QUERVAIN, P. L. MERCANTON, etc. Nouveaux Memoires de las Société helvétique des Sciences naturelles. Vol. LIII, 1920. Suisse.

NOTE.—I am very glad that my friend Professor Mercanton has called attention to the fact that the Swiss Expedition to Greenland made seven ascensions near the margin of the inland ice on Disco Bay. Quervain'shavn does not appear on maps of Greenland since it was named after the eminent Swiss savant whose lamented death has just been announced. It is largely for this reason that I had not observed the fact of these ascensions near the ice cap.—*Wm. H. Hobbs.*

A NEW THERMOMETER SCALE

Another attempt to improve upon the thermometer scales in current use has come to our notice. Dr. F. E. Aspinwall of Miami, Fla., has devised the "Homigrade scale," in which the 0° is the same as the 0° Centigrade, while 100° corresponds to the normal temperature of the human body, 98.6° F. Doctor Aspinwall points out that his 0° is a "vital heat zero," because it marks the temperature at which vital action of organisms ceases or becomes dormant.

The ratio of the homigrade degree to the Fahrenheit is as 1.5 to 1, hence conversion is a simple matter.

The proposed scale renders the use of fractions in recording temperatures still less necessary than with the Fahrenheit scale. The 0° and the 100° are at critical points which, though familiar, do not both refer to changes of state of water. This is a serious fault, and undeniably attractive in some respects as Doctor Aspinwall's proposal is, the fault will doubtless severely restrict acceptance of the new scale.

A complete discussion of the homigrade scale may be found in the Medical Journal and Record, for November 3, 1926.—*B. M. V.*

AN UNUSUAL WELL[1]

On the mesa of Juniper Flat, Oreg., there is a well having unusual characteristics. In addition to furnishing a plentiful supply of very good water, it also serves as the barometer of its proud owner, Joe Riggles, and his neighbors.

Twelve to twenty-four hours before a storm arrives a gentle draft begins to come out of the well, the intensity increasing rapidly to almost a roar. Throughout the duration of a storm the well continues to "blow," sometimes so violently as to emit a cloud of water vapor. Within 12 to 24 hours after the storm has passed the well will cease blowing and begin to inhale and air will continue to flow into it until equilibrium is reached or a new period of exhalation begins.

The well is 458 feet deep, drilled through a blanket of basalt overlying the older formation. In the drilling numerous crevices and cavities were encountered in basalt formation. The local theory of the well's behavior is that it taps some long subterranean chamber having an outlet somewhere in the mountains miles away. Such an explanation is open to considerable doubt. More likely the well merely taps a number of local crevices or chambers containing air of approximately constant temperature and pressure. This air flows in or out of the well as the surface pressure is greater or lower than the subterranean pressure. The relatively long periods over which the well is in activity may be accounted for by the throttling effect of the small orifice through which the air has to pass. Some idea of the pressure at which the well begins to exhale may be had from the following table. The pressures were interpolated from the isobars of the A. M. weather map.

January 22—30.60, well quiet.
24—30.30, well quiet
25—30.25, well quiet.
26—30.05, well began blowing about noon.
27—29.75, well blowing violently.
28—no further data.

It is probable that some interesting information might be gained from an air current meter and barograph if installed at the well.—*A. G. Simson*, Forest Service.

[1] The relation between air pressure and breathing wells has been known for some time. See this Rev. 28:293, 43:562, 44:75, 46:26,114l.—*A. J. H.*

TORNADOES STARTED BY AN OIL FIRE.

[Reprinted from Meteorological Magazine, January, 1927, pp. 292-294.]

The Scientific American for December, 1926, contains a vivid description of the effects of a fire which destroyed nearly 6,000,000 barrels of oil at San Luis Obispo, Calif. An account of the event was given by Mr. J. E. Hissong, of the local weather bureau of this California city. He states that the fire was started by lightning and that initially four tanks, each containing 750,000 barrels of oil, "boiled over." An immense quantity of burning oil was spread over an area which was estimated at about 900 acres, or nearly 4 square kilometers. Flames seemingly leaped up to a height of 1,000 feet, and at the same time violent whirlwinds formed over the fire. During the period when the large reservoirs were burning and the convection was probably at its strongest, the whirls were numerous and violent. Some hundreds of whirls were observed simultaneously, many of them presenting the features of true tornadoes, with gyrating funnel-shaped clouds, the condensation of vapor in the central portions showing up clearly against the dark background of smoke. It is reported that some of the central funnels were not more than about a foot in diameter.

One of the whirls traveling downwind to a cottage about a thousand yards away, picked up the cottage and carried it a distance of 150 feet, where it was dropped, a complete wreck, the two occupants being killed.

Mr. Hissong reports that strong southerly winds prevailed initially, shifting later to west, and eventually to northwest. He attributes the formation of the whirls to the veering of the wind, which coincided more or less with the information of the whirls. It is difficult to see how this in itself could account for the whirls, and the present writer suggests that the whirls were such as might have occurred, independently of any wind, by the convection currents removing large masses of air, which would be replaced by the convergence of air from all sides. The converging air by retaining its original moment of momentum, about the center of the rising column, would after convergence have acquired a large velocity of rotation about the center, and would give rise to whirls of the nature observed.